

Reply to the Comment on "Electric Field Scaling at a $B = 0$ Metal-Insulator Transition in Two Dimensions"

In their Comment [1] on our recent Letter [2] on electric field scaling at the $B = 0$ conductor-insulator transition in silicon MOSFETs, Ismail and coauthors report experimental data that they attribute to the occurrence of a transition to a conducting phase in another silicon-based material, a Si/SiGe heterostructure.

If correct, it is indeed a very interesting finding which would establish the occurrence of this unexpected transition in a material other than high-mobility silicon MOSFETs. We point out, however, that the claim is based on little data. Measurements were taken at only three temperatures (0.4, 1.2 and 4.2 K) for each electron density, and a single crossing point is not clearly demonstrated in Fig.1(a). In fact, there is not even enough data to preclude a possible maximum in conductivity between 0.4 and 4.2 K. It is important to note also that the electron densities range from $0.55n_c$ to $3.3n_c$, so that the scaling curves shown in Fig. 1 (b) encompass values of $\delta \equiv |n - n_c|/n_c$ from 0.15 to 2.3, well outside the critical region where one would expect scaling to be obeyed.

Ismail *et al.* claim that the conductivity at the critical point is not universal: the conductivity of their devices at the critical point is $100e^2/h$, two orders of magnitude larger than in silicon. We note that MOSFETs which differ in mobility by a factor of nearly 4 (20,000 to 75,000 cm^2/Vs) were found to have quite similar critical conductivities near $e^2/3h$ (at about 0.1 K), implying a universal value, at least for electrons in silicon inversion layers on

Si-SiO₂ interfaces [2-4].

A conductivity that increases with decreasing temperature does not by itself establish the existence of a conducting phase. An example is provided by low-mobility silicon MOSFETs, where an increase in the conductivity in the restricted range from 5 K to 1.2 K was attributed to temperature-dependent Coulomb scattering in the *insulating* phase [5]. Although there may well prove to be a conductor-insulator transition in Si/SiGe heterostructures, additional data are needed to establish the validity of this claim.

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